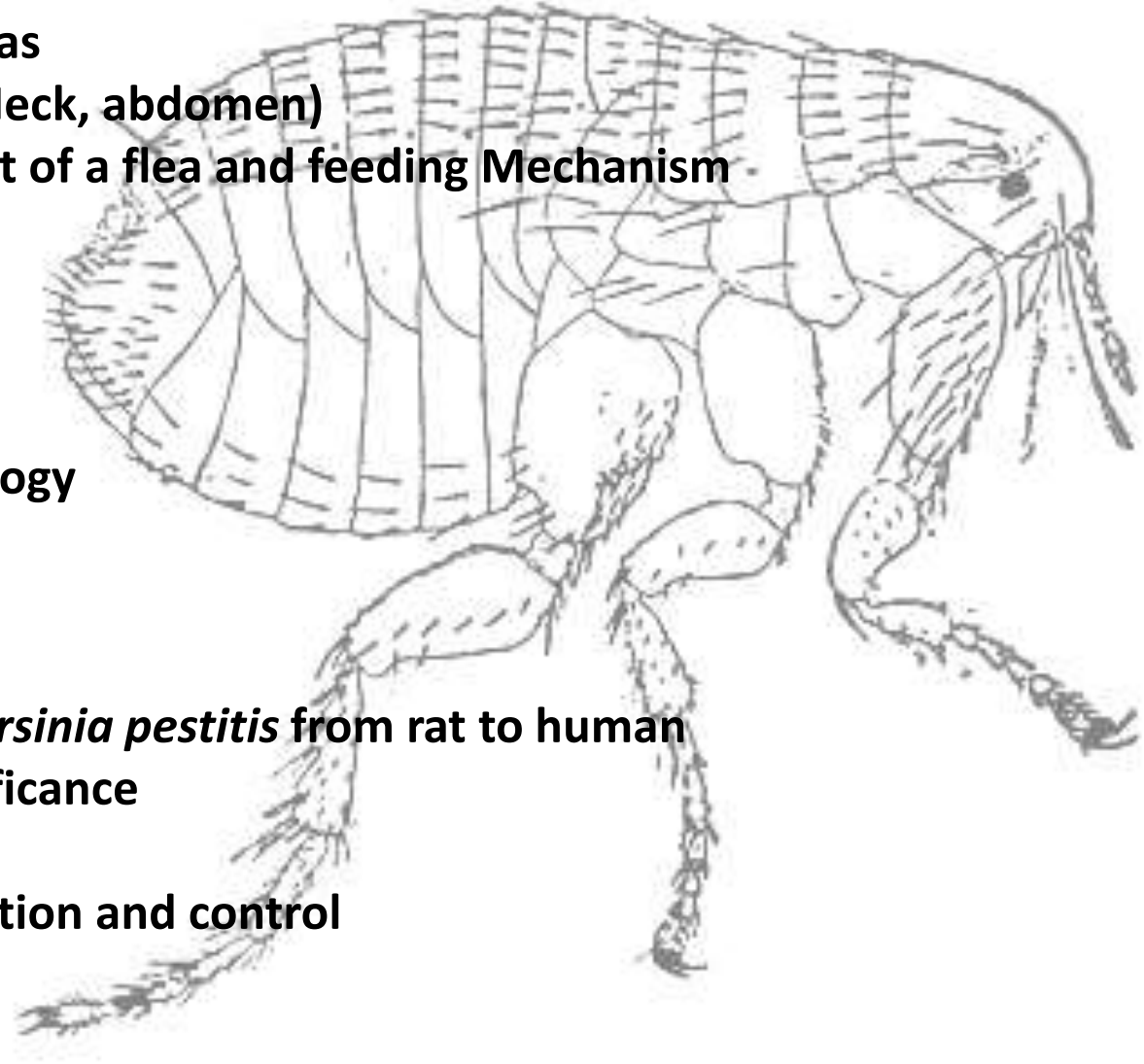


- Different species of fleas
- Structure of the fleas
  - ✓ Adult (Head, Neck, abdomen)
  - ✓ Mouth part of a flea and feeding Mechanism
  - ✓ Eggs
  - ✓ Larva
  - ✓ Pupa
- Behaviour and Ecology
- Life cycle
- Pathogenesis
- Vector Importance
- Transmission of *Yersinia pestis* from rat to human
- Public Health Significance
- Diagnosis
- Treatment, prevention and control

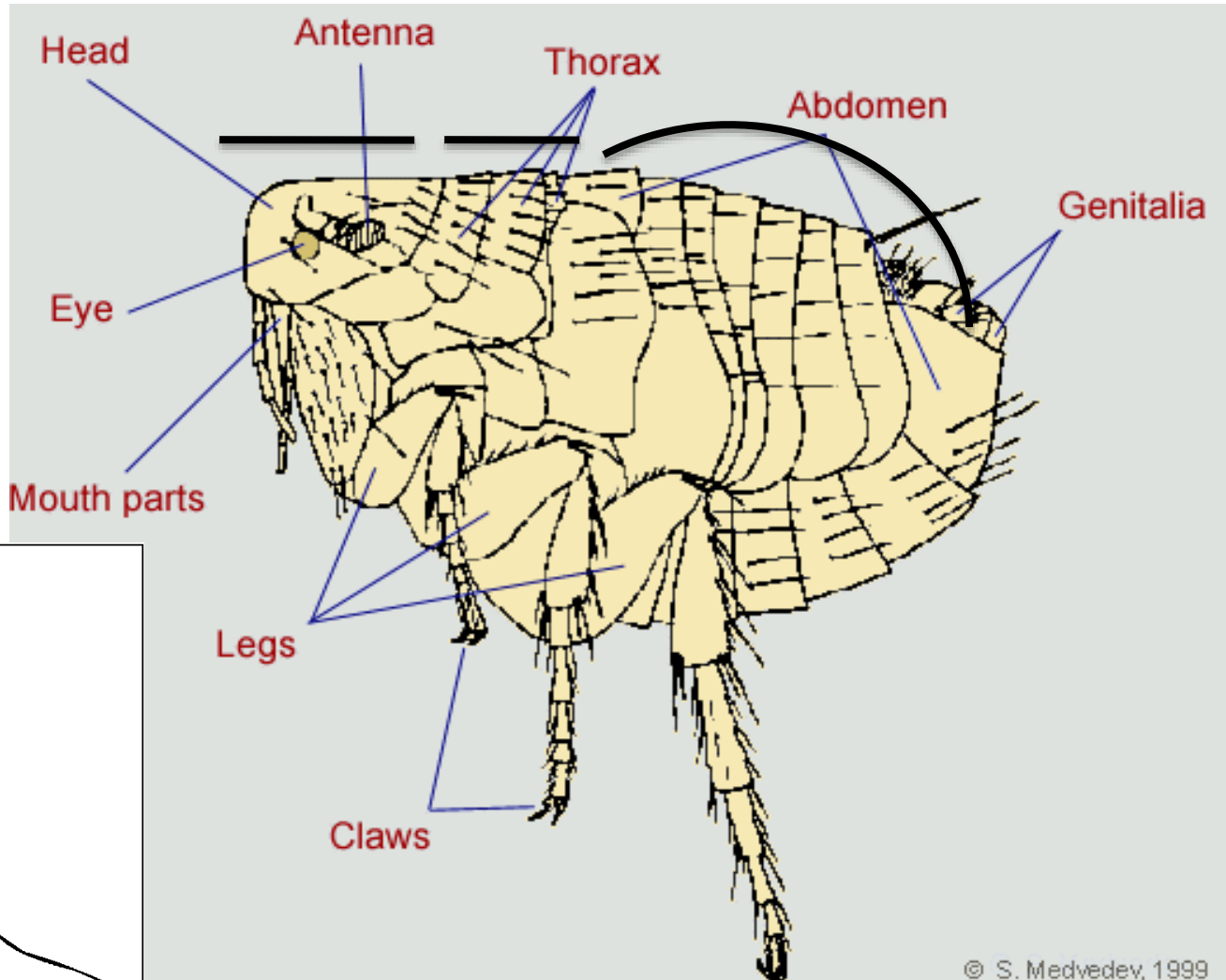


# Order: Siphonaptera (Flea)

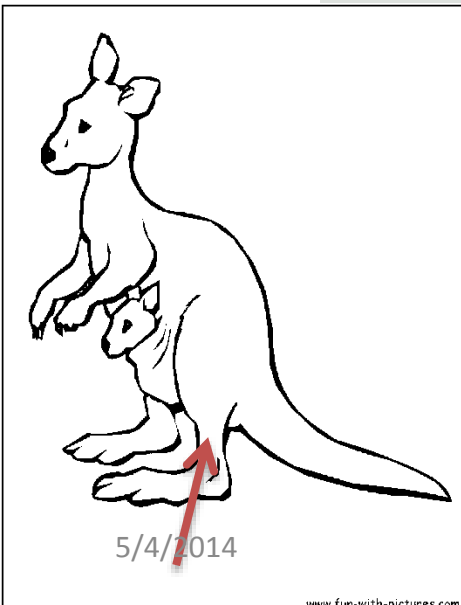
Family.	Species (Vector)	Common Name	Host
<b>Pulicidae</b>	<i>Ctenocephalides canis</i>	<b>Dog flea</b>	Dog & cat
	<i>Ct .felis</i>	<b>Cat flea</b>	Cat & dog
	<i>Pulex irritants</i>	<b>Human flea</b>	Man( Dog, cat, swine)
	<i>Xenopsylla cheopis</i>	<b>Oriental rat flea, Tropical rat flea</b>	Human, Rodent, cats
	<i>Xenopsylla asiatica</i>		
	<i>Xenopsylla braziliensis</i>		
	<i>Xenopsylla bantorum</i>		
	<i>Echidnophoga gallinacea</i>	<b>Stick tight flea of bird/Burrowing Flea</b>	Bird (Comb, wattles), Dog, Man
	<i>Tunga penetrans</i>	<b>Jigger flea of human /sand flea /Chigoe flea /Burrowing</b>	Man (pig)
	<i>Spilopsyllus cuniculi</i>	<b>Rabbit flea</b>	Rabbit (ear), Dog and Cat (Ear/pinna)
<b>Ceratophyllidae</b>	<i>Ceratophyllus gallinae</i>	<b>Commonest poultry Flea / European Hen flea</b>	Poultry, (Man, Pet animal)
	<i>Ceratophyllus niger</i>	Western Chicken flea	Chicken
	<i>Nosopsyllus faciatus</i>	<b>Nothern Rat flea</b>	Rodent (Man and other animal).
<b>Leptopsyllidae</b>	<i>Leptopsylla segnis</i>	European mouse/House mouse flea	
<b>Ctenophthalmidae</b>	<i>Stenoponia tripectinata</i>		

# Structure of a Flea

Adult

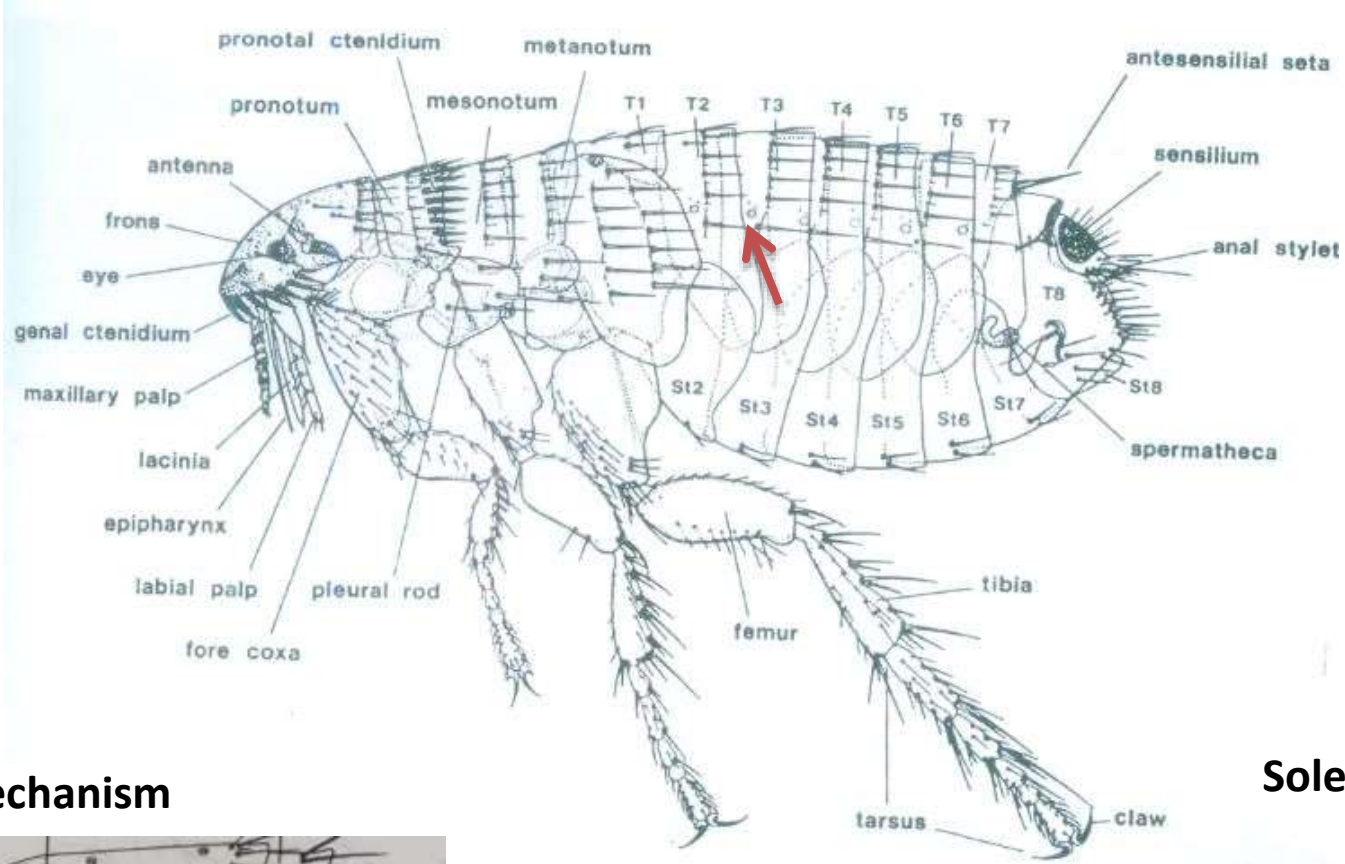


© S. Medvedev, 1999



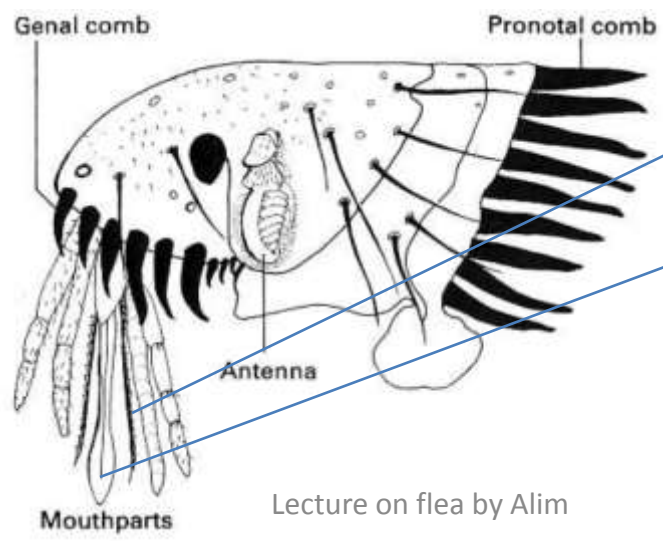
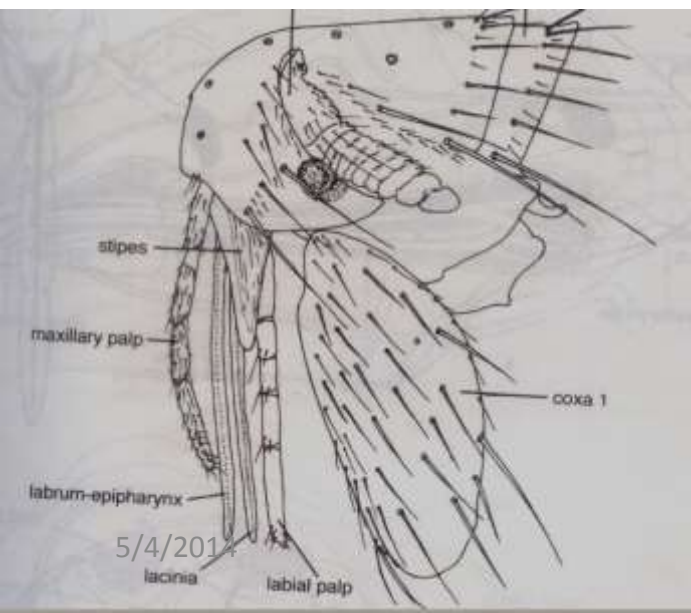
5/4/2014

Lecture on flea by Alim



Solenophages??

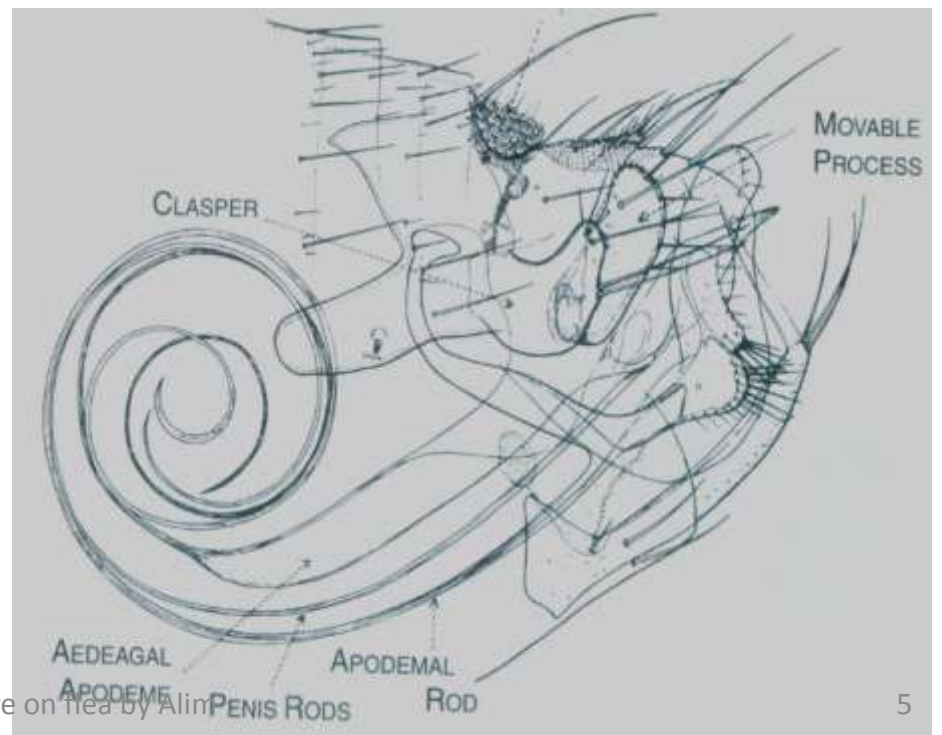
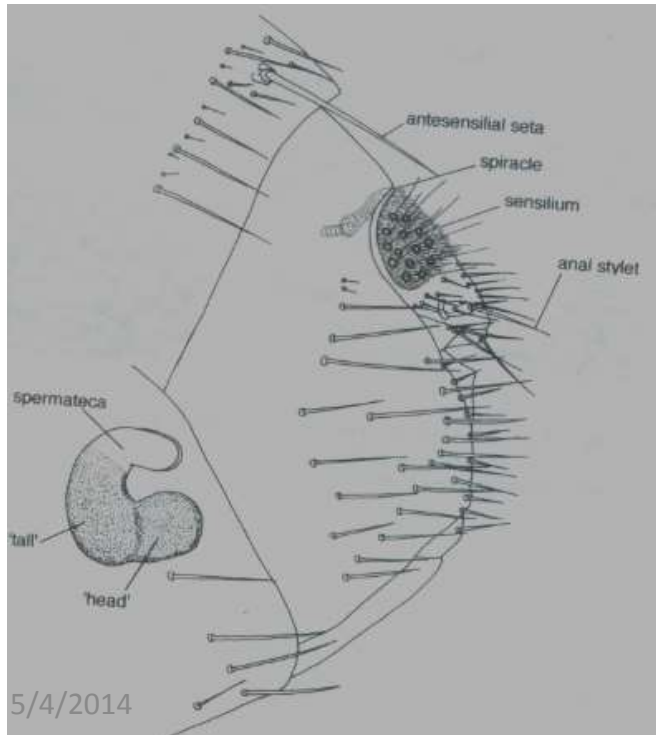
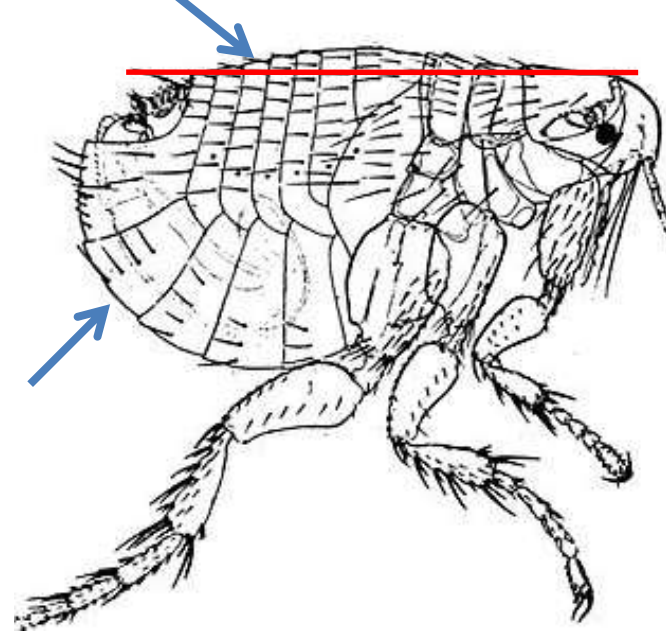
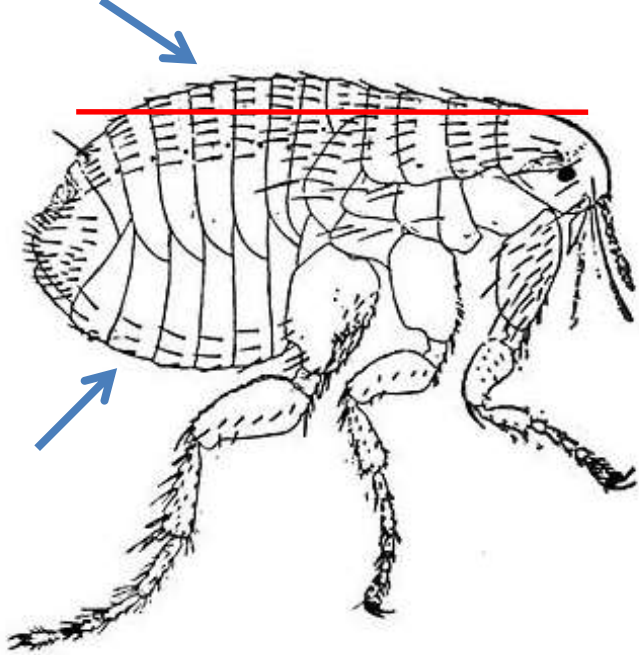
**Feeding Mechanism**



Stylets/fascicle=  
Two maxillary laciniae  
+ Labrum epipharynx

Cibrarial Pump  
Pharyngeal pump

Apyrase??



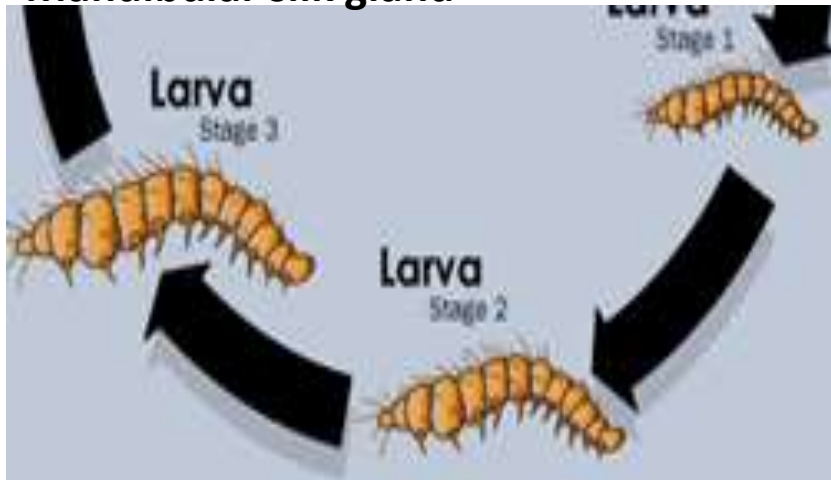
## Eggs



## Larva



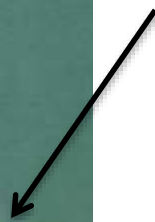
## Mandibular silk gland





**Head tubercle**

**Cocoon helps to camouflage it**



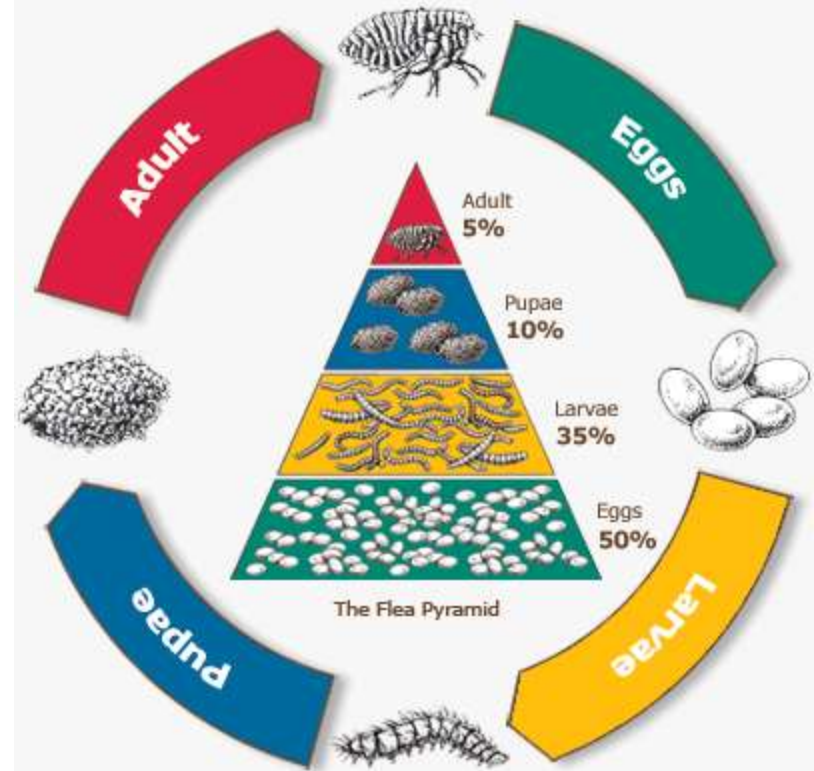
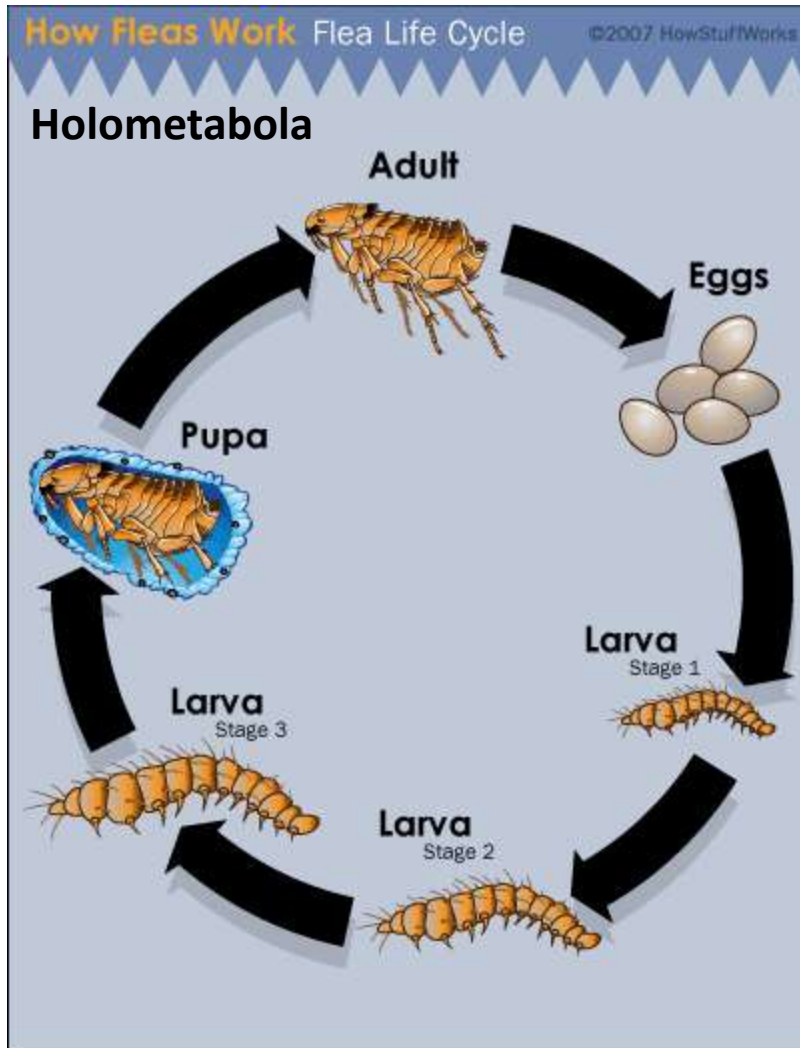
**Pupa**

**Exarate/True pupa**



# Behaviour and Ecology

## Life cycle



Flea Pyramid

PPP: 30-75 days (optimum tem...upto 2 years (hot tem)

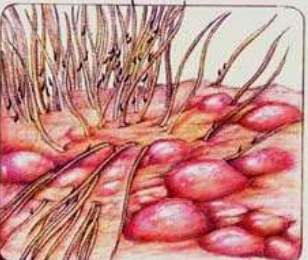
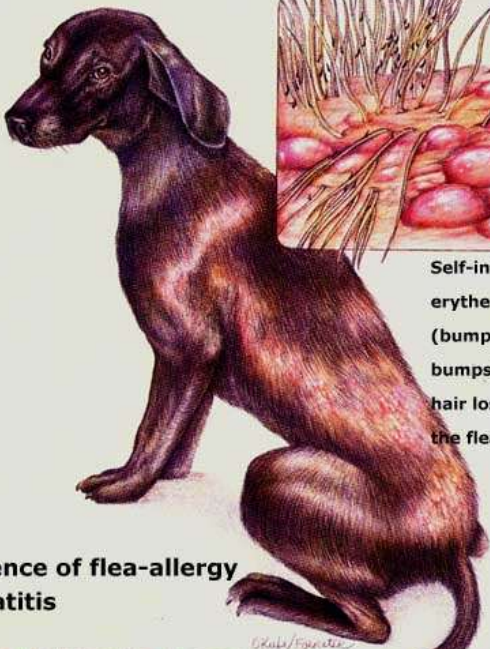
What about the L/C of burrowing flea?????



# Pathogenesis (In pets)

- ❖ Anaemia and Flea dirt
- ❖ Flea Allergy Dermatitis (FAD)

## Flea Allergy Dermatitis



Self-inflicted trauma results in erythema (redness), papules (bumps), pustules (pus-filled bumps), crusts (scabs) and hair loss in the areas where the fleas feed.

### Sequence of flea-allergy dermatitis



**Flea punctures skin to feed.** **Flea saliva sets up an antigen-antibody reaction.** **Excoriation and inflammation result from self-inflicted trauma.** **Bacteria invade causing pustules**



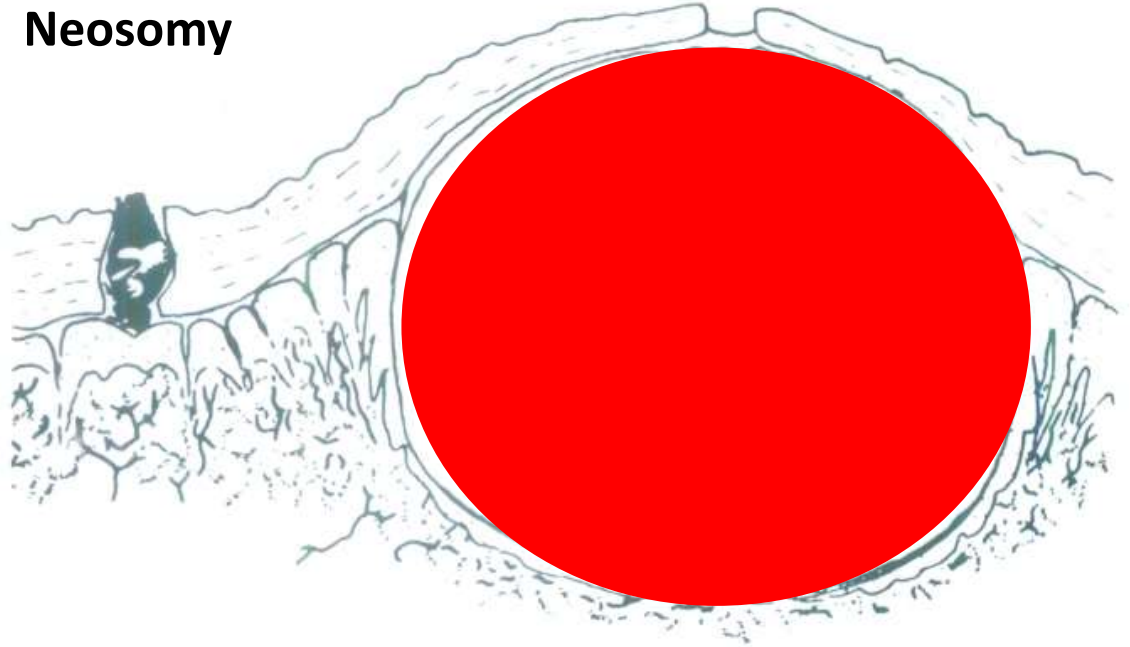
*T penetrans* on dog snout



# ❖ In Poultry

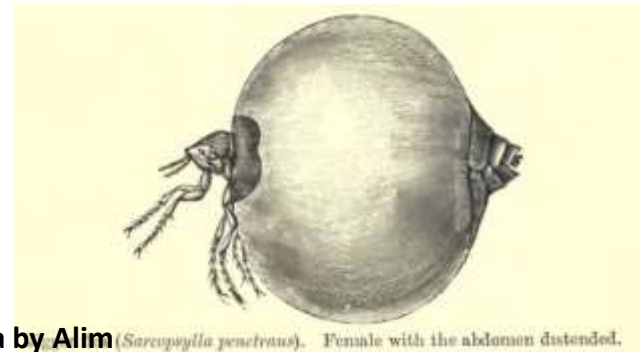
Long barbed mouth part, aid in attachment

## Neosomy



*Echidnophaga gallinacea* on a rooster

**Figure 9.11** Chigoe (*Tunga penetrans*), adult females embedded in host skin; abdominal segments starting to swell in specimen greatly enlarged, gravid female at right.



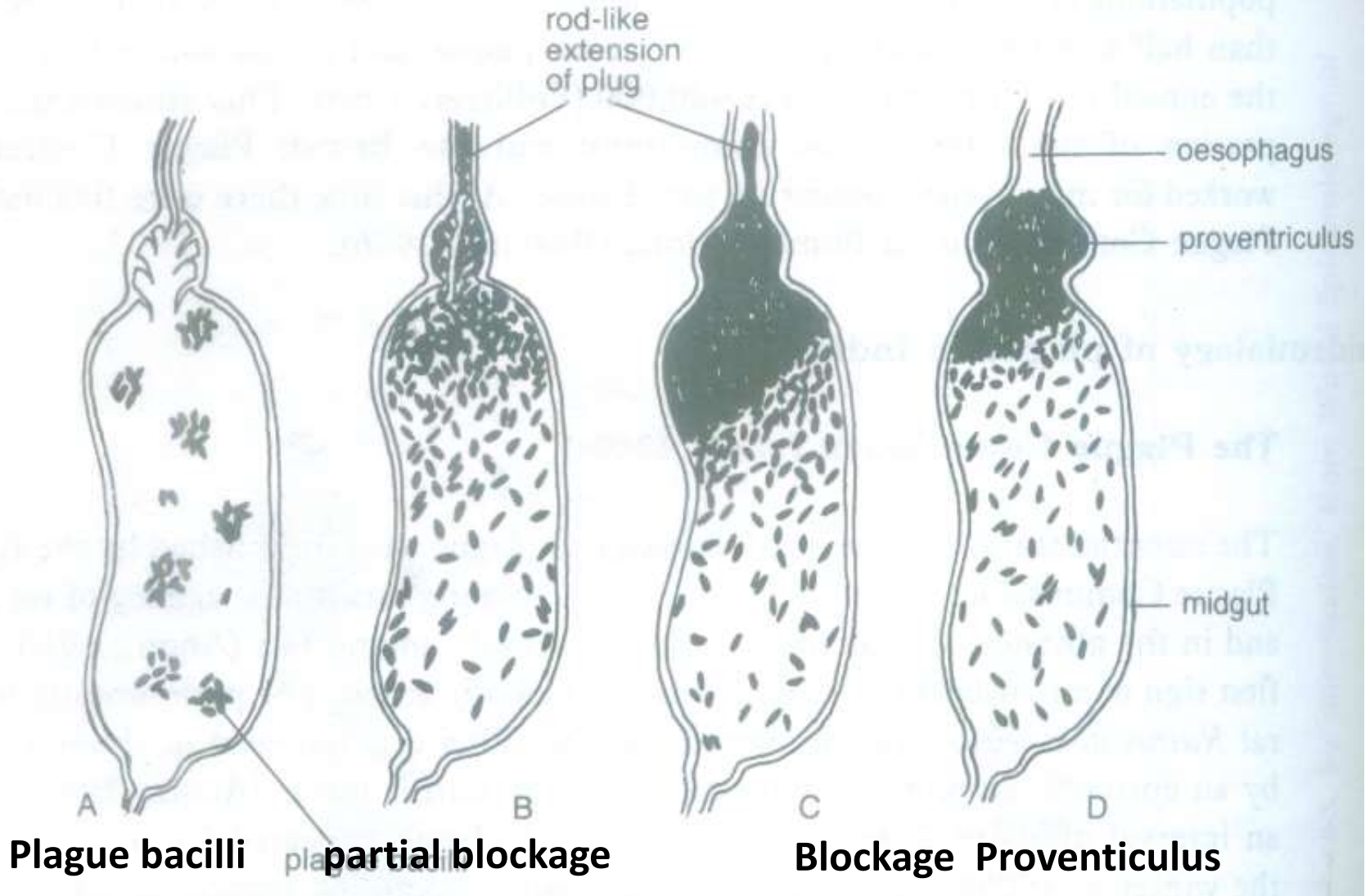
Lecture on flea by Alim (*Sarcophylla penetrans*). Female with the abdomen distended.

# Vector Importance

<u>Disease Agent</u>	<u>Disease</u>	<u>Vector(s)</u>	<u>Host(s)</u>	<u>Geographic Area</u>
<b>VIRUS:</b>				
Myxoma virus	Myxomatosis	<i>Spilopsyllus cuniculi</i>	Rabbits	Europe, Australia
<b>BACTERIA:</b>				
<i>Coxiella burnetii</i>	Q fever	Several fleas	Mammals	Global
<i>Farcisella tularensis</i>	Tularemia	Several fleas	Mammals	Global
<i>Rickettsia typhi</i>	Murine typhus	<i>Xenopsylla</i> , <i>Ctenocephalides</i>	Mammals	Global
<i>Rickettsia prowazekii</i>	Sylvatic epidemic typhus,	<i>Orchopeas howardi</i>	Flying squirrels, humans	North America
<i>Yersinia pestis</i>	Plague	Mainly <i>Xenopsylla</i>	Humans, rodents, cats	Global
<b>PROTOZA:</b>				
<i>Trypanosoma lewisi</i>	Murine trypanosomiasis	<i>Nosopsyllus</i> , <i>Xenopsylla</i>	Rats	Global
<i>Trypanosoma nabiassi</i>	Rabbit trypanosomiasis	<i>Spilopsyllus cuniculi</i>	Rabbits	Global
<b>NEMATODA:</b>				
<i>Acanthocheilonema reconditum</i>	Canine filariasis	<i>Ctenocephalides</i>	Canivores	Global
<b>CESTODA:</b>				
<i>Dipylidium caninum</i> *	Double-pored tapeworm	<i>Ctenocephalides</i>	Dogs, cats, humans	Global
<i>Hymenolepis diminuta</i> *	Rodent tapeworm	<i>Nosopsyllus</i> , <i>Xenopsylla</i>	Rodents, humans	Global
<i>Hymenolepis nana</i> *	Dwarf tapeworm	<i>Nosopsyllus</i> , <i>Xenopsylla</i>	Rodents	Global

\*Fleas are not vectors for these pathogens but instead serve as intermediate hosts.

# Transmission of *Yersinia pestis* from Rat to Human



# Public Health Significance



**Tungiasis**



**Purpura pulicosa**

**Roseola pulicosa**



# Public Health Significance

- ✓ Annoying bite (*Purpura pulicosa* and *Roseola pulicosa*)
- ✓ Discomfort
- ✓ Dermatitis/Allergic reaction
- ✓ Painful lesion of skin, feet, toe (*Tunga penetrans*/burrowing flea)
- ✓ I/H of tape worm
- ✓ Different disease
  - ✓ **Plague** ( urban plague, rural/sylvatic wild rodent plague  
*/la peste/Black death*)
  - ✓ Murine Typhus (*Rickettsia typhi*)
  - ✓ Tungiasis

## Diagnosis

# Laboratory Confirmation/ Species Identification

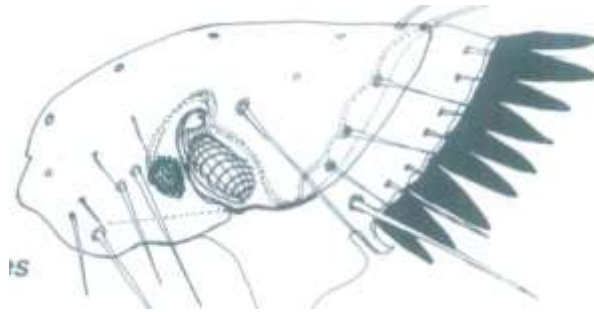
No comb/ctenidia

With Pronatal comb only

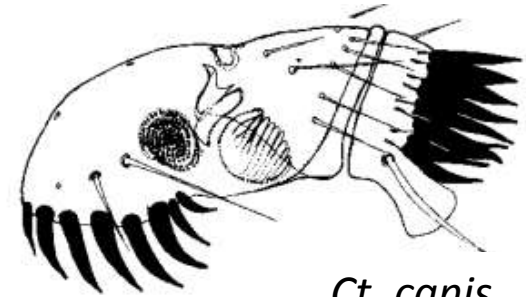
with Genal and Pronatal comb



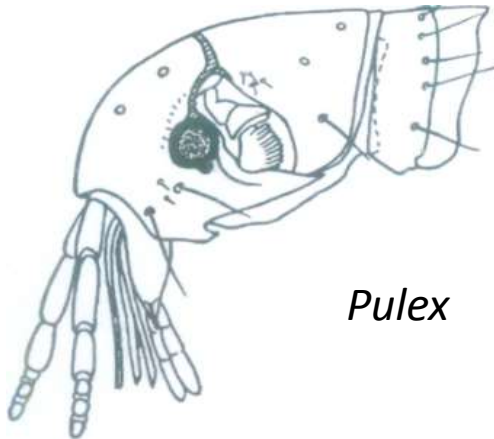
*Echidnophaga*



*Ceratophyllus*



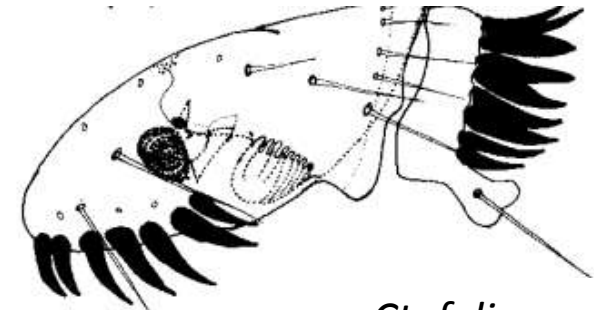
*Ct. canis*



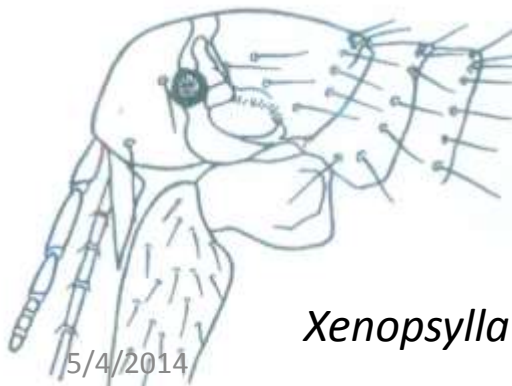
*Pulex*



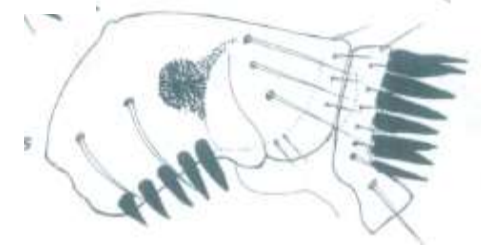
*Nosopsyllus fasciatus*



*Ct. felis*



*Xenopsylla*



*Spinopsyllus*

# Treatment, Prevention and Control

Chemical used to kill fleas called **Pulicides**



Insecticide/  
Pulicidess



Pulicidal  
Shampooing

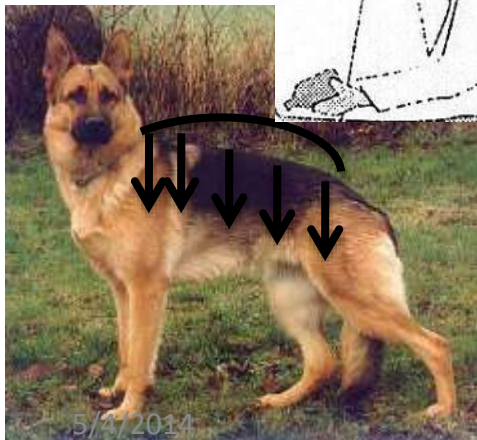


Flea repellent



Flea collar

Pour on



Dust bath in Poultry



Cleaning (Flea Hot spot)<sup>16</sup>



# References

1. D.S., Kettle (2000). **Medical and Veterinary Entomology**, CAB International, 2<sup>nd</sup> edi, pp...
2. G.M.Urquhart., J.Armour., J.L.Duncan., F.W. Jennings., (1966). **Veterinary Parasitology**, Black well Science Ltd., 2<sup>nd</sup> edi. pp:
3. D.D.Bowman (2009). **Georgis' Parasitology For Veterinarians**, WB Saunders Company, 9<sup>th</sup> edi. pp....



## THANKS

Prepared by DR. Md. Abdul Alim  
Assistant Professor

Department of Pathology and Parasitology, CVASU  
PhD fellow, James Cook University, Australia